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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

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In the Matter of)
)
Amendment of the Commission's) GEN Docket No. 90-314
Rules to Establish New Personal) RM-7140, RM-7175, RM-7618
Communications Services)

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To: The Commission

JAN 3 1994

COMMENTS OF APPLE COMPUTER, INC.

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Apple Computer, Inc. ("Apple"), pursuant to Section 1.429 of the Commission's Rules, hereby submits its comments in response to certain of the petitions for reconsideration and/or clarification of the Federal Communications Commission's (the "Commission" or "FCC") Second Report and Order in the above-referenced docket (the "Second R&O"),¹ particularly those related to unlicensed operation.

As Apple pointed out in its own Petition for Reconsideration and/or Clarification in this proceeding ("Apple's Petition"), the Second R&O resolved most of the issues concerning the regulatory treatment of PCS and, with few exceptions, has provided a workable framework for the introduction and use of new PCS products and services, including Data-PCS. Apple's Petition, and the Petitions for Reconsideration and/or Clarification filed by others, however, identify certain respects in which the Second R&O should be modified to maximize the usefulness, rapid startup, and flexibility of Data-PCS technologies. In these Comments, Apple will concentrate on these issues.²

¹ Second Report and Order, GEN Docket No. 90-314, RM-7140, RM-7175, RM-7618, 8 FCC Rcd 7700 (released October 22, 1993).

² These comments do not address the need to modify the existing spectrum allocation for unlicensed PCS or certain issues related to the final designation of UTAM, Inc., both of which are being addressed in the context of Apple's Emergency Petition, nor do they reiterate arguments made in Apple's Petition for Reconsideration and/or Clarification of the Second R&O, filed December 8, 1993, that were not raised in other petitions.

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I. THE COMMISSION SHOULD DELETE THE "PACKING RULES" IMPOSED ON THE ASYNCHRONOUS AND ISOCHRONOUS SUB-BANDS.

In its Petition, Apple called for the removal of the "packing rules," which require most unlicensed devices to begin searching for available frequencies at the edges of the allocated bands.³ As Apple discussed, these rules would preclude the use of guard bands, thereby prohibiting what may be the most effective method for protecting adjacent-channel users from interference.

Other petitioners also called for elimination or radical modification of the packing rules,⁴ and no party opposed this change with respect to either the asynchronous or isochronous sub-bands. While most of the petitioners restricted their comments to the isochronous sub-band,⁵ virtually all of the arguments against the packing rules apply equally to the asynchronous sub-band. Emerging asynchronous applications, which will be predominately non-coordinatable, vulnerable to adjacent channel interference, and, therefore, not able to use special local channel access rules, would be particularly harmed by the packing rules, as Apple previously has explained.

Accordingly, Apple requests that the Commission delete not only Section 15.321(b), as requested by the other petitioners, but also Section 15.323(b).

³ Apple's Petition at 5-6. The "packing rules" are set forth in 47 C.F.R. §§ 15.321(b) and 15.323(b).

⁴ See Ericsson Petition for Reconsideration and Clarification at 2 and Appendix 1, pp. 2-5 ("Ericsson Petition"); AT&T Petition for Limited Clarification and Reconsideration at Attachment B, p. 10 ("AT&T Petition"); Northern Telecom Petition for Reconsideration at 24 and Appendix A, pp. 2-3 ("Northern Telecom Petition"); Motorola Petition for Reconsideration and Clarification of PCS Second Report and Order at 13-14 ("Motorola Petition"); SpectraLink Petition for Reconsideration at 9-10 ("SpectraLink Petition"); Rockwell Petition for Reconsideration at 7-9; Metricom Petition for Reconsideration and Clarification at 3, 5-6; WINForum Petition for Limited Clarification or Modification at 4-5. Unless otherwise noted, citations in these Comments are to Petitions for Reconsideration and/or Clarification filed in the above-referenced docket on December 8, 1993.

⁵ WINForum, which originally represented a broad constituency of voice and data equipment manufacturers, is notably silent on this and other asynchronous sub-band issues.

II. THE COMMISSION SHOULD PERMIT INTEROPERABLE, CO-SITE SYSTEMS TO USE DIFFERENT MONITORING THRESHOLDS, AS LONG AS THEY DEFER TO OTHER UNLICENSED DEVICES.

In its Petition for Reconsideration, SpectraLink proposed a method for removing some remaining limitations on the operation of isochronous systems in high-density user environments.⁶ SpectraLink suggested applying a different monitoring deferral threshold to devices that are within the “family” and under the control of a given system, as compared with the threshold requiring deferral to other devices and systems.

SpectraLink identified the problems facing integrated systems operating in high-density environments and proposed its solution after WINForum had completed the development of its etiquette. The principal focus during the development of WINForum’s etiquette was the coexistence of unlike systems, rather than the interoperation of like devices. Accordingly, WINForum concluded that in order for the etiquette to “work,” it was not appropriate to require an exchange of information between unlike devices.

While this fundamental premise of the etiquette remains valid, it should not preclude manufacturers from employing appropriate mechanisms for enhancing the use of many interoperable devices at a single site through information exchange among such devices. It is, however, necessary to maintain protection levels for non-interoperable systems, as currently provided by the Commission’s rules, which dictate specific deferral thresholds. Accordingly, to the extent that SpectraLink’s proposal can be allowed without undermining the requirement that unlicensed PCS systems must defer to other unlicensed PCS systems and devices, Apple believes that it has substantial merit and, therefore, recommends its adoption.

In addition, because SpectraLink’s suggested modification is equally valid for asynchronous systems, Apple requests that the Commission include a similar provision in the rules governing operation in the asynchronous band.

⁶ SpectraLink Petition at 4-6.

III. THE COMMISSION SHOULD LIMIT LICENSED PCS BASE STATION AND MOBILE UNIT POWER LEVELS AND SHOULD CONTROL THE EMISSION MASKS FOR TRANSMITTERS OPERATING IN SPECTRUM ADJACENT TO THE UNLICENSED BAND.

Several petitioners interested in the development of licensed-PCS have urged the Commission to increase the authorized power limits for base stations and licensed mobile units, typically calling for base power levels in the range of 1000 watts EIRP.⁷

When the Commission established the rules governing unlicensed devices, it imposed strict limits on emissions by such devices in order to protect users of bands adjacent to the unlicensed band, including licensed PCS providers, from interference. This was done despite the fact that unlicensed devices may operate with a maximum power of just over one-third of a watt, and typically will use much less power.

The FCC should be at least equally concerned with preventing interference from licensed devices to unlicensed devices. The potential problem includes not only emissions into adjacent unlicensed channels, but also signal overload. Base stations installed near or within buildings to provide in-building penetration for licensed PCS will present particular threats, as will proximate handheld units.⁸

In order to prevent the obliteration of communications by unlicensed devices in many situations, the Commission should adopt a mandatory

⁷ See, e.g., Ameritech Petition for Reconsideration at 1-2 (1000 watts); Motorola Petition at 7-8 (1000 watts); Northern Telecom Petition at 4-21 (at least 1000 watts); Sprint Petition for Reconsideration and Clarification at 14-15 (1600 watts); MCI Petition for Partial Reconsideration and Clarification at 7-10 (1000 watts; 20 watts for mobile and ancillary units); Pacific Bell and Nevada Bell Petition for Reconsideration at 3-4 (1900 watts per channel); PacTel Corporation Petition for Partial Reconsideration at 1-6 (1500 watts); Petition for Partial Reconsideration of Time Warner Telecommunications at 11-13; US West Petition for Expedited Partial Reconsideration and for Clarification at 12-15 (1600-7950 watts). These requests have been opposed by one party that has already filed comments on the petitions. Nextel Communications, Inc., Opposition to Petitions for Reconsideration, GEN Docket No. 90-314, at 14-15 (filed December 30, 1993).

⁸ Motorola, addressing a similar issue with respect to licensed systems, discusses how "...these strong signals can overload...receivers and prevent reception of relatively weak desired mobile signals," and warns that if frequency selective filters are required, "...complexity and cost [will be] significantly increased." Motorola Petition at 8.

uplink/downlink designation scheme,⁹ provide for strict emission limits outside each licensed channel, and limit the EIRP of licensed emitters (whether base, mobile, or portable) operating in the five MHz on either side of the unlicensed band to no more than two watts under all conditions.

IV. THE COMMISSION SHOULD ELIMINATE THE RESTRICTIVE SUBDIVISION OF THE ISOCHRONOUS SUB-BAND.

Apple and several other petitioners called for the elimination of the rigorous subchannelization of a portion of the isochronous band. As Ericsson stated, "[n]umerous companies who have actively participated in WINForum and generally in GEN Docket No. 90-314 favor the complete removal of isochronous band segmentation because of the negative ramifications for pre-deployment and post-deployment of isochronous devices."¹⁰

Opposition to the existing subchannelization is widespread.¹¹ The arguments against fixed segmentation are not limited to technical issues of spectrum efficiency and the applicability of various modulation techniques; they are also closely associated with the proper infliction of "equal pain" with respect to band clearing that the Commission has sought to dispense. Creating a dichotomy of technologies is unlikely to "accelerate a focused attempt at band clearing for all technologies," which will be necessary to "ensur[e] widespread, successful PCS deployment."¹²

⁹ Such a scheme could be similar to those proposed by Motorola and Ericsson. See Motorola Petition at 8-9; Ericsson Petition at 3-5.

¹⁰ Ericsson Petition at 7, n.8.

¹¹ For example on August 31, 1993, nine WINForum member companies — predominately representing voice interests — submitted a request to the WINForum Board of Directors to delete the pertinent paragraph of the then prevailing WINForum draft etiquette (designating fixed segmentation) "before it is discussed with the FCC." No action was taken by WINForum with respect to this request. While AT&T has presented purported "clarifications to ensure proper interpretation" of the WINForum etiquette — which do not remove the existing rigid segmenting — and has implied that its view reflects an "industry consensus," AT&T Petition at 5, AT&T's "clarification" represents only its view of the etiquette. Indeed, even WINForum itself no longer can speak on behalf of the entire unlicensed PCS "industry": none of the ten largest US makers of personal computers (IBM, Apple, Compaq, Packard Bell, Dell, Gateway 2000, AST, Tandy, Toshiba and ZDS) has participated in WINForum since Apple's withdrawal on September 2.

¹² Ericsson Petition at Appendix 1, p. 11.

The Commission therefore should apply the less restrictive rules in Section 15.321(a), which now apply only to the 1890-1900 MHz isochronous sub-band, to the entire 20 MHz allocated for isochronous operation.¹³ Likewise, it should firmly reject any effort to expand technology-preclusive fixed segmentation approaches that might give an unfair advantage to venerable "CT2" technologies at the expense of new technologies.

V. THE COMMISSION SHOULD DEFINE THE RESPONSIBILITIES OF THE ENTITY THAT IS ENTRUSTED WITH BAND CLEARING AND COORDINATION RESPONSIBILITIES.

Apple has participated as an observer in the UTAM meetings that have been open to the public (it appears that it is the only computer company to do so) and supports the development of measures to permit and expedite microwave transition and band clearing. It is not clear, however, that UTAM's role and accountability have been defined in sufficient detail by the Commission and accepted by UTAM. Without a precise statement of UTAM's responsibilities, it is impossible for UTAM to proceed effectively.¹⁴

For example, in UTAM's Petition for Clarification or Partial Reconsideration, UTAM asks the Commission to broaden its standard governing acceptable location verification methods for early-deployed devices by clarifying that the applicable rule requires only that manufacturers establish "procedures...to prevent premature activation."¹⁵ UTAM has made clear its desire to give manufacturers broad discretion with respect to early deployed devices. UTAM, moreover, previously has stated that "[m]anufacturers must be permitted to determine the most effective techniques [or disabling mechanisms],

¹³ Apple has also petitioned the Commission to provide a single contiguous 20 MHz allocation for isochronous operation, instead of two separated 10-MHz bands. See Comments of Apple Computer, Inc. on Emergency Petition, GEN Docket 90-314, at 9 (filed November 8, 1993) and related filings; see also SpectraLink Petition at 10-13 (urging the Commission to allocate 20 MHz of continuous spectrum for isochronous operation); Ericsson Petition at 3, n.2 (noting support for two contiguous unsegmented 20 MHz spectrum blocks for unlicensed PCS).

¹⁴ This clarification is necessary to permit UTAM to continue its efforts, and will be required whether UTAM or another entity is ultimately designated as the entity responsible for band clearing and coordination.

¹⁵ UTAM, Inc. Petition for Clarification or Partial Reconsideration at 5-6.

in terms of both cost and interference avoidance, for incorporation in their particular equipment.”¹⁶

The Commission, however, has repeatedly stressed the importance of preventing undue interference to existing microwave stations and does not appear to agree that manufacturers may balance non-interference concerns against cost considerations.

VI. THE COMMISSION SHOULD SUPPORT ALL AGREED-UPON MEANS FOR DEALING WITH INTERFERENCE TO CO-CHANNEL AND ADJACENT CHANNEL MICROWAVE STATIONS.

In its Petition for Reconsideration, Bell Atlantic made a case for “requiring” upgrading of certain microwave stations, correctly warning that a “PCS operator who satisfies...guidelines in its own channel can wind up causing excessive channel interference...through no technical fault of its own.”¹⁷ Bell Atlantic asks that such upgrading be required “whenever a PCS operator ... demonstrates that upgrading...will reduce interference...and...will pay the cost of the upgrade.”¹⁸

Bell Atlantic’s concern applies not only to licensed PCS, but also to possible interference from unlicensed devices into wideband, adjacent channel microwave stations. Its proposal, if applied with respect to the use of the unlicensed band, would permit affected parties to address such interference problems without relocating all adjacent channel stations in advance of initial product deployment. Yet this solution faces some of the obstacles that affect “retuning,” as proposed by Apple, and, like retuning, could be viewed as prohibited under the existing rules, unless the Commission clarifies its intent in this respect, as requested by Apple.¹⁹

While system upgrades may be subject to certain practical difficulties, it will be important for interested parties to have available to them all possible

¹⁶ Reply Comments of UTAM, GEN Docket No. 90-314, ET Docket No. 92-100, at 19 (filed July 20, 1993).

¹⁷ Bell Atlantic Petition for Reconsideration at 22-23.

¹⁸ Id. at 23.

¹⁹ See Apple’s Petition for Reconsideration, ET Docket No. 92-9, RM-7981, RM-8004, at 9-10 (filed September 13, 1993).

tools, including upgrading and retuning,²⁰ in order to complete the band clearing process as expeditiously and satisfactorily as possible. Therefore, the Commission should adopt a policy of encouraging (if not requiring) the use of tools such as retuning and upgrading.

VII. THE COMMISSION SHOULD NOT DECREASE THE PRESENT ALLOCATION FOR UNLICENSED PCS TO PROVIDE FOR "PRIVATE PCS."

In their Petitions for Reconsideration, both APCO and UTC asked the Commission to provide for "private PCS."²¹ According to these parties, "many of the new public safety technologies will require unique, wide band allocations incompatible with conventional PCS operations."²²

Apple's original proposal for Data-PCS²³ encompasses a broad range of new communications applications concentrating upon high-speed digital data communications, such as those described in APCO's and UTC's examples. Apple emphatically supports the goals of these entities. However, any provision for "private PCS," as such, within the frequencies recently allocated by the Commission for unlicensed services would undermine the development of such services.²⁴

Certain of the needs discussed by UTC and APCO, and many other valuable functions for public safety and utility interests, can be fulfilled by proper use of the asynchronous portion of the unlicensed band.²⁵ As with other

²⁰ Some of these tools have been described by Comsearch as examples of valuable "frequency re-engineering" techniques. Other such measures could include the use of guard bands and sideways in-channel retuning.

²¹ APCO Petition for Reconsideration at 3-6 ("APCO Petition"); UTC Petition for Reconsideration at 2-12.

²² APCO Petition at 4.

²³ Apple Petition for Rulemaking, "Data-PCS," RM-7618 (filed January 28, 1991).

²⁴ See, e.g., Apple's Emergency Petition, GEN Docket No. 90-314, ET Docket No. 92-100, at 1-2 (filed September 13, 1993) (discussing the importance of a 40 MHz allocation for unlicensed PCS); Second R&O at ¶ 88 (allocating 40 MHz to unlicensed PCS "[i]n view of the strong demand for unlicensed PCS predicted by those developing such services"). A coalition of associations representing public safety and other entities filed on December 23, 1993 a Petition for Rulemaking seeking an allocation for private PCS services in the 2 GHz band, using spectrum reallocated from the federal government pursuant to the Omnibus Budget Reconciliation Act of 1993.

²⁵ For example, wideband data links can convey graphics and other information at an emergency or disaster site between portable units and a command center that might have massive mobile file storage of "building plans and hazardous material

Data-PCS applications, however, the applications described by UTC and APCO cannot develop if their operations are restricted to particular locales where frequency coordination with microwave incumbents is required. The arguments of UTC and APCO thus underscore the need for rapid nationwide band clearing to permit nomadic devices to operate anywhere and everywhere without threatening microwave stations or being limited to places where "prior coordination" has been achieved.

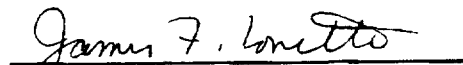
While Apple, therefore, does not believe it is possible or advisable to provide for "private PCS" on a licensed, protected basis at this time, the Commission should continue its efforts to enable entities developing unlicensed products to clear spectrum nationwide, as promptly as possible, for unlicensed nomadic devices, including those of value to the public safety and utility interests.

CONCLUSION

Wherefore, for the reasons stated above, Apple requests that the Commission grant or deny the petitions for reconsideration filed in response to the Second R&O as discussed herein.

Respectfully submitted,

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information," as described by APCO at page 3. Numerous similar examples of Data-PCS applications could be developed.

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